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High strength insulated construction panel for load bearing walls - is made of foamed plastics externally grooved for bonding render coat and is wire mesh reinforced with vertical cores for concrete filling (Eng)

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The foamed plastic main insulating element (3) of the panel is finished on both sides with vertical grooves (7) for receiving a final coat of render or roughcast (17). Vertical cavities (10) are separated by a dividing wall which is non-continuous to allow free communication between cavities.

Both sides are covered by mesh reinforcement (4, 5) tied through the cavities by cross-wires (6). Mesh reinforcement cages (11) are fitted into the cavities (10) which are then filled with concrete. The wire mesh (4, 5) is extended (4a, 5a) at the panel edges to provide, along with the joint formations (8, 9) a bonded joint between panels.

USE/ADVANTAGE - A lightweight, strong, and rigid construction panel with high thermal and acoustic insulation properties, which is suitable for external or internal loadbearing walls and in earthquake areas. (8pp Dwg.No.3/4)

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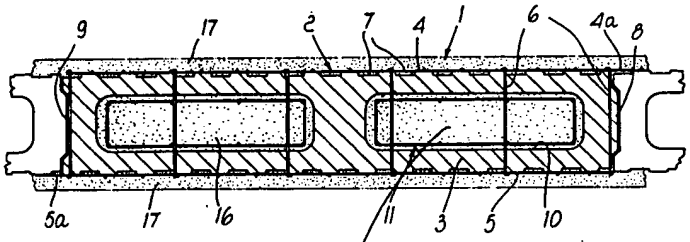

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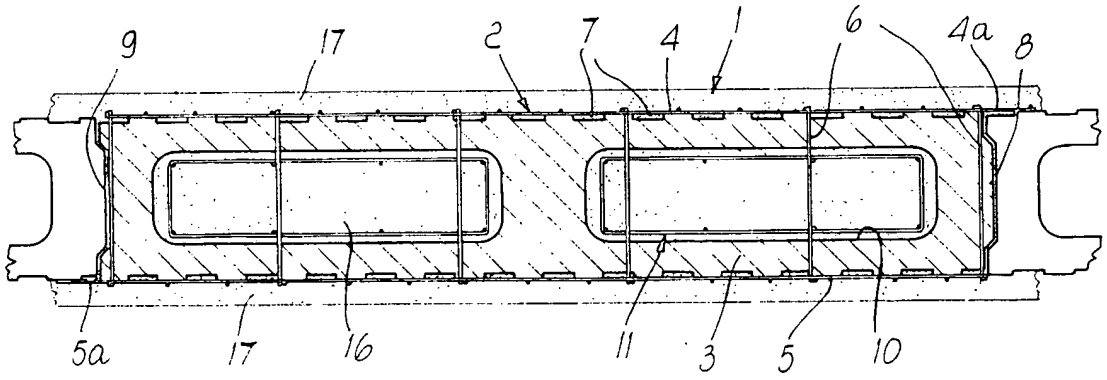
(54) Insulated wall panel.

(57) Panel (1) for building walls with thermal and acoustic insulation characteristics including an insulating layer (3) of foamed plastic material, which has parallel undulations (7) on its opposite faces and is crossed, along its median plane, by at least one vertical cavity (10) provided with lateral openings (14) which are arranged mutually opposite along the same median plane. A metal reinforcement frame (11) is arranged inside the cavity of the insulating layer. A lattice (2) is rigidly coupled to the insulating layer and is constituted by a pair of metal nets (4,5) which are associated with the opposite faces of the insulating layer and are mutually connected by transverse elements (6) which pass through the insulating layer.

FIG.3



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The present invention relates to an insulated wall panel particularly with thermal and acoustic insulation characteristics.

It is known that in the construction sector there is the need to build walls capable of ensuring high thermal and acoustic insulation.

For this purpose, prefabricated panels are currently used, side by side with conventional construction systems; these panels allow to rationalize and simplify wall building, with obvious benefits in terms of production and installation costs.

Known prefabricated panels, however, have limited strength features, so that they are generally not suitable for building load-bearing walls. These panels furthermore often have a considerable weight, so that they are difficult to handle during transport and installation.

A principal aim of the present invention is to solve the above mentioned problem by providing a panel which allows to rapidly and easily build, on site, load-bearing walls having considerable strength and high thermal and acoustic insulation characteristics.

Within the scope of this aim, another aim of the present invention is to provide a panel which is simple in concept, has a reduced weight and is easy to install, versatile in use and has a relatively low cost.

With these and other aims in view, there is provided, according to the present invention, a panel for building walls with thermal and acoustic insulation characteristics, characterized in that it comprises: an insulating layer of foamed plastic material, which has parallel undulations on its opposite faces and is crossed, along its median plane, by at least one vertical cavity which is provided with lateral openings arranged mutually opposite along the same median plane; a metal reinforcement frame, which is arranged inside said cavity of the insulating layer; and a lattice, which is constituted by a pair of metal nets which are associated with the opposite faces of said insulating layer and are mutually connected by transverse elements which pass through said insulating layer.

The details and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof, illustrated by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a vertical sectional view of the panel according to the present invention, taken along a median plane;

figure 2 is a vertical sectional view of the panel, taken along the plane II-II of figure 1;

figure 3 is a horizontal sectional view of a portion of a wall built with the panels according to the present invention;

figure 4 is a horizontal sectional view of a different embodiment of the insulating layer of the panel according to the present invention.

With particular reference to the above figures, the reference numeral 1 generally designates the panel for building walls with thermal and acoustic insulation characteristics.

The panel 1 comprises a metal lattice 2 in which an insulating layer 3, made of foamed material such as polystyrene, is interposed. More particularly, the lattice 2 comprises a pair of electrically welded metal nets 4 and 5 having a rectangular mesh and between which the insulating layer 3 is interposed.

The metal nets 4 and 5 are mutually connected by means of iron elements or rods 6 which are driven transversely through the insulating layer 3. The rods 6 are welded to the nets 4 and 5 so as to constitute a rigid and hyperstatic connection for blocking mutual movements.

Preferably, the metal nets 4 and 5 and the rods 6 are constituted by wires made of galvanized cold-redrawn high-strength low-carbon steel; the insulating layer 3 is instead preferably made of high-density polystyrene of the self-extinguishing virgin type.

The insulating layer 3 has, on its opposite faces, parallel undulations which are in practice constituted by an orderly series of vertical grooves 7. The metal nets 4 and 5 are associated with the opposite faces of the insulating layer 3 in contact with the crests or ridges formed in between said grooves 7.

Conveniently, the metal nets 4 and 5 form, with respect to the insulating layer 3, respective wings 4a and 5a which protrude from opposite vertical sides. Said wings are suitable to overlap, during installation, on the adjacent panels, so that in practice they cause the continuity of said metal nets in the wall thus built (see figure 3).

Also with the purpose of giving greater continuity to the junction of the panels, the insulating layer 3 has, along one vertical end, a raised portion 8 which extends longitudinally and, on the opposite end, a recess 9 whose profile is complementary to that of said raised portion 8.

The insulating layer 3 is crossed, on its median plane, by a pair of vertical cavities 10 arranged side by side. The cavities 3 have a rectangular transverse cross-section with appropriately rounded corners, and their longer sides are parallel to the front faces of the panel.

The cavities 10 are suitable to accommodate respective metal reinforcement frames 11 which are constituted by a plurality of annular elements 12 which are distributed along horizontal parallel planes and are mutually connected by longitudinal elements 13 which are welded with uniform spac-

ing. The reinforcement frames 11 are equally made of high-strength galvanized steel wires.

The insulating layer 3 is furthermore crossed by horizontal openings 14 formed along the median vertical plane, so as to intersect the cavities 10. The openings 14 have a rectangular transverse cross-section and their longer sides are arranged vertically.

The vertical cavities 10 and the horizontal openings 14 thus form a sort of alveolate interspace along said median plane of the insulating layer 3; said alveolate interspace surrounds a plurality of solid parts 15 which have a vertically elongated shape and the lower end 15a whereof is appropriately chamfered in the shape of a wedge.

The interspace of the panels is suitable to receive a concrete casting 16 during installation. The metal reinforcement frames 11 arranged inside the cavities 10 are embedded in this concrete casting. The hydrostatic thrust of the concrete during casting is withstood by the considerable rigidity of the lattice 2. Furthermore, the wedge-like shape of the ends 15a of the solid parts 15 of the alveolate interspace facilitates the escape of any air bubbles present in the concrete casting.

The panel furthermore allows to apply, on the opposite faces, a layer of structural mortar or roughcast 17 having appropriate strength characteristics.

It should be noted that the metal nets 4 and 5 are embedded in said layer 17, also by virtue of the grooves 7 formed on the opposite faces of the insulating layer 3. This obviously produces a more stable anchoring of the metal nets 4 and 5 and helps to increase the strength of the walls which are built.

The metallic overlap of the nets 4 and 5 provided by the wings 4a, 5a at the vertical joining plane of adjacent panels produces continuity in the support of the plaster, contrasting the forming of cracks at this critical region.

The vertical load-bearing element is therefore constituted by an alveolate partition made of reinforced concrete, covered by a layer of thermally and acoustically insulating material, suitable to receive a layer of mortar or plaster which will bind to the metal nets 4 and 5. The thickness of the reinforced-concrete partition can be changed according to static requirements by varying the size of the cavities 10 and of the openings 14.

This load-bearing element can be particularly suitable for the construction of buildings with earthquake-proof requirements.

The fact should be particularly stressed that the openings 14 connect the cavities 10 of an individual panel as well as those of the adjacent panels. The reinforced-concrete alveolate partition is therefore continuous along the entire wall, in order to provide greater strength.

In the solution illustrated in figure 4, the insulating layer is formed by two symmetrical portions 3a and 3b which are mutually joined along a joining plane which coincides with the median vertical plane of the panel. In order to provide this joint, the first portion 3a has, proximate to its lateral margins, respective vertical ridges 18a having a dovetail cross-section, whereas the second portion 3b has a similar ridge 18b along its median axis; the ridges 18a and 18b are meant to fit in corresponding slots formed in the adjacent portion of the insulating layer.

Once assembled, the two portions 3a and 3b reconstitute the previously described shape of the insulating layer 3.

The described panel ultimately allows to easily build load-bearing walls which have high thermal and acoustic insulation characteristics, are easy to install and can be adapted to the different construction requirements.

The dimensions of the panel, and particularly its height, may be changed freely according to the constructive requirements. In particular, the panels may be built horizontally with a same machine and be cut to size according to the required height.

Obviously, the panel can also be used as a curtain-walling element or as an internal dividing element, for example to complete a building built with conventional methods.

In the practical embodiment of the invention, the materials employed, as well as the shape and the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Panel for building walls with thermal and acoustic insulation characteristics, characterized in that it comprises: an insulating layer (3) of foamed plastic material, which has parallel undulations (7) on its opposite faces and is crossed, along its median plane, by at least one vertical cavity (10) which is provided with lateral openings (14) arranged mutually opposite along the same median plane; a metal reinforcement frame (11), which is arranged inside said cavity of the insulating layer; and a lattice (2), which is constituted by a pair of metal nets (4,5) which are associated with the

opposite faces of said insulating layer and are mutually connected by transverse elements (6) which pass through said insulating layer.

2. Panel according to claim 1, characterized in that said insulating layer is crossed by a plurality of vertical cavities (10) and of horizontal openings (14) which mutually intersect so as to form, along said median plane, a sort of alveolate interspace suitable to contain a concrete casting (16).

3. Panel according to claim 2, characterized in that said alveolate interspace surrounds a plurality of solid parts (15) having a vertically elongated shape and the lower end (15a) whereof is chamfered so as to form a wedge.

4. Panel according to claim 1, characterized in that said insulating layer has, along one vertical end, a raised portion (8) which extends longitudinally and, on the other end, a recess (9) the profile whereof is complementary to that of said raised portion, for joining to the adjacent panels.

5. Panel according to claim 1, characterized in that said insulating layer (3) is formed by two symmetrical portions (3a,3b) which are mutually joined along a joining plane which coincides with said median vertical plane, at least one of said portions having a plurality of vertical ridges (18a,18b) which have a dovetail cross-section and are meant to engage in corresponding slots formed in the other portion.

6. Panel according to claim 1, characterized in that said metal reinforcement frame arranged inside said cavity of the insulating layer is constituted by a plurality of annular elements (12) distributed along parallel planes and mutually connected by longitudinal elements (13).

7. Panel according to claim 1, characterized in that said parallel undulations are constituted by an orderly series of vertical grooves (7).

8. Panel according to claim 1, characterized in that said metal nets form, with respect to said insulating layer, respective wings (4a,5a) which protrude from opposite vertical sides and are meant to overlap, during installation, on the adjacent panels, so as to produce the continuity of said metal nets.

9. Panel according to claim 1, characterized in that it provides for the application, on its opposite faces, of a layer of structural mortar (17) in which said metal nets are meant to be embedded.

10. Insulated wall panel, comprising a main insulating layer (3) crossed in a median plane by at least one vertical cavity (10), a metal reinforcement frame (11) and a concrete casting both arranged in said insulating layer (3), and at least one support lattice (2) arranged on the outside of said insulating layer.

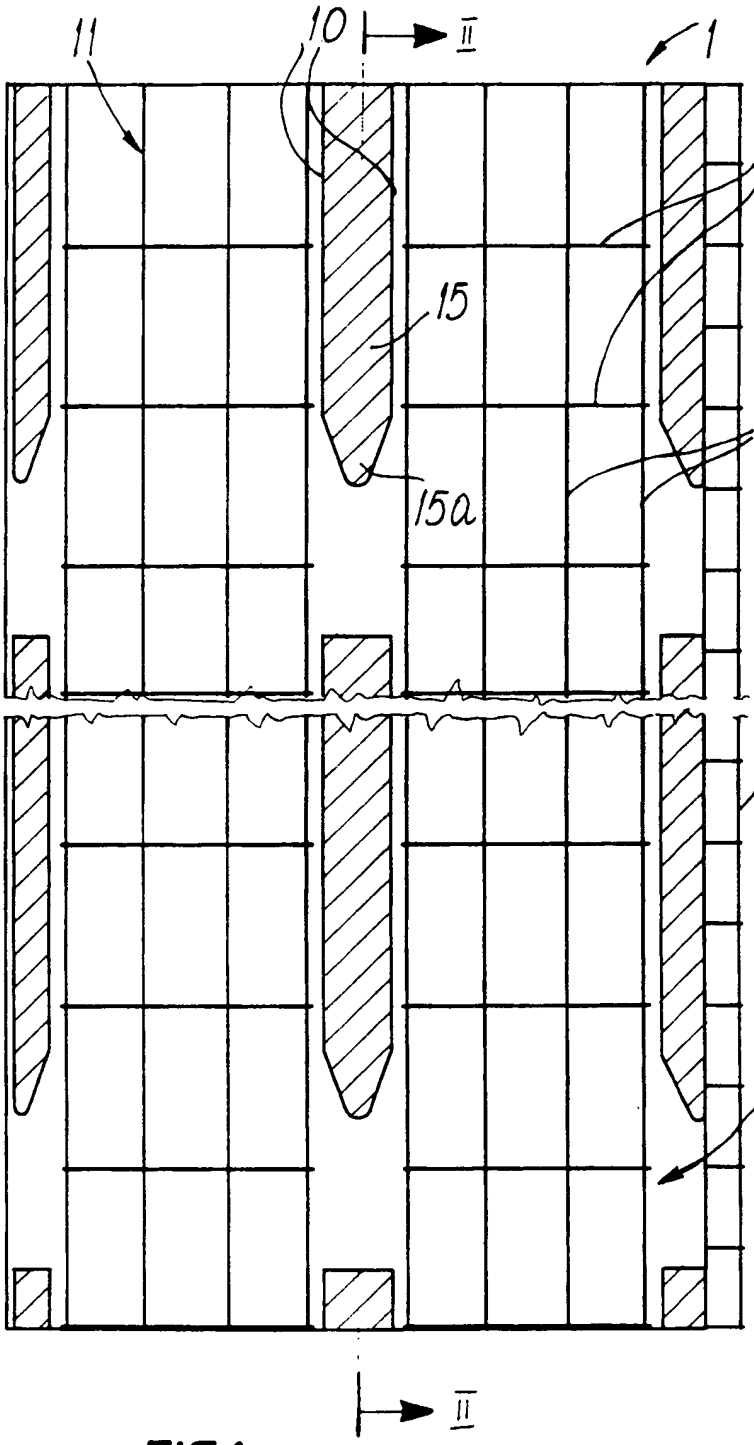

FIG.1

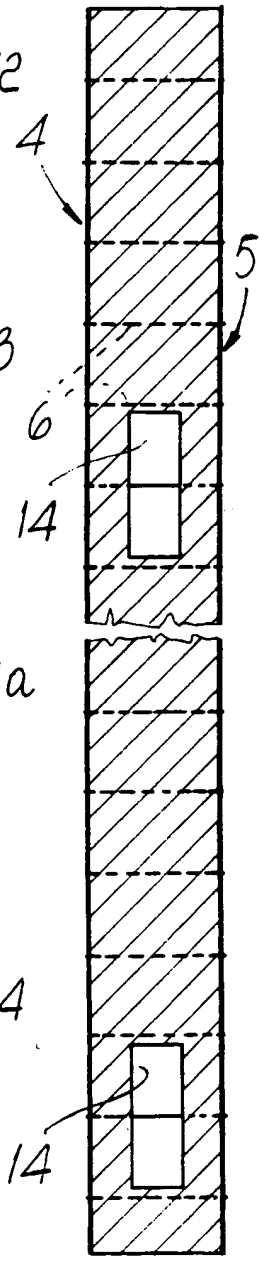

FIG.2

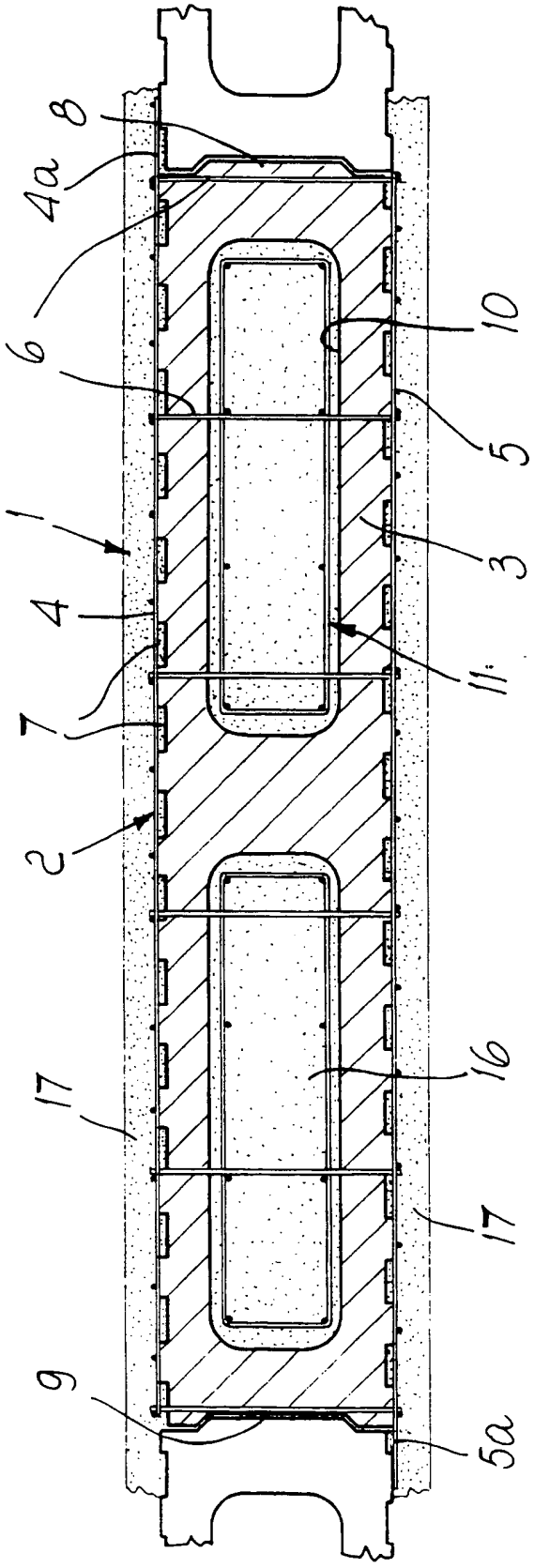

FIG.3

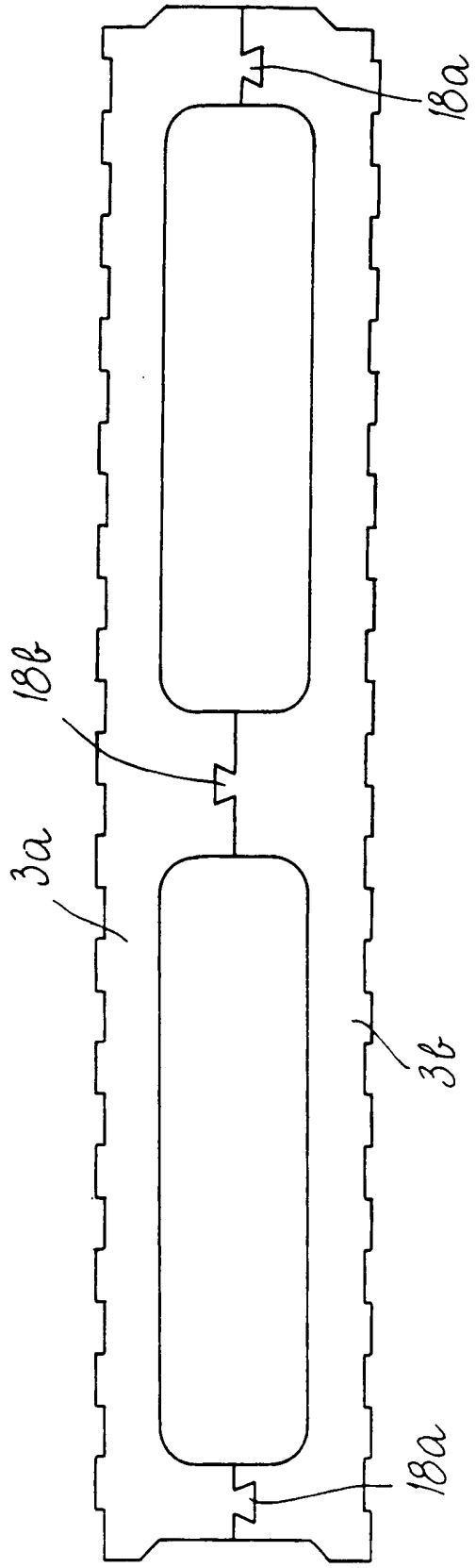

FIG.4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 11 5824

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	WO-A-80 00232 (AMETEX) * page 23, paragraph 2 - page 28, paragraph 1; figures 13-17,21-24 *	1,4,7,9, 10	E04C2/26
A	DE-A-26 43 630 (NORZI) * page 6, last paragraph - page 8; figures 3,4 *	1,2,5,9, 10	
A	FR-A-2 584 437 (ROBERT) * claims 1,2; figures 1,2 *	1,7,9,10	
A	FR-A-2 570 738 (LE CLAINCHE)		

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

E04C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 January 1994	VANDEVONDELE, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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